"Service"

A DIGEST OF ELECTRONIC NEWS AND VIEWS

THIS magazine is designed to present students with current news and information affecting the field of Electronics. Articles dealing with general business subjects, which in many cases the student finds necessary for his complete success, will also be included. To enable readers to obtain original articles, details of the origin of any condensed matter will be quoted.

Again we must apologise to our readers for the delayed production of your magazine. However, we feel that you will all agree that the re-introduction of "How to Build" articles to our pages is a worthwhile effort. The experimental and production work in connection with these articles are to blame for the delay. However you may expect to find the June issue in your mail box less than four weeks hence.

The portable described herein is something really outstanding. What is essentially a summertime set has been presented to you out of season for a very definite reason. From present indications, the material position is so acute that had we waited until the spring to present it, we feel that many would-be builders of the set would possibly have met with disappointment when seeking materials to build it. As it is, all materials are readily available at the present time for those who require them.

May we also mention how delighted we are to welcome back to active studies, many old students who are enrolling for the new course, "Television, Frequency Modulation, Facsimile."

MAY, 1947

WHAT TO LOOK FOR IN THIS ISSUE

This monthly publication is produced by the
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U.S.A. FEDERAL COMMUNICATIONS COMMISSION EXAMINES COLOUR TELEVISION

We have to hand an interesting document in the shape of the complete report of the U.S.A. Federal Communications Commission on the future of colour television in the U.S.A.

The report was instigated by an application from Columbia Broadcasting System for the adoption of their system of colour television.

The Columbia Broadcasting System's application to have this so-called sequential system of colour television adopted as the official U.S. standard was rejected by the F.C.C. The full report covering all the reasons for their action would occupy many pages of "Service" and so we intend only to give a digest of the important points here.

In its preliminary remarks, the Committee underlined the dissimilarity between sound broadcasting and television in so far as the adoption of standards for the latter presented a far more onerous task than the performance of a similar function for sound broadcasting. It was pointed out that with sound broadcasting, quite revolutionary improvements may be made without causing the obsolescence of existing receiving apparatus. This fact is very evident when one considers that a receiver designed as far back as, say, 1922, when broadcasting first commenced in this country, is quite capable of receiving a present day broadcast programme. This, in spite of the fact that the technical quality of a present day transmission is superior beyond comparison with those transmissions of the early 1920's.

With television however, the situation is vastly different. Considering for the moment, ordinary monochrome or black and white transmissions, take the single factor of definition of the transmitted and received picture. To obtain adequate detail in a picture, we must transmit a fairly large number of lines per second. In England at present, the standard is 405 lines per picture, while in America, the standard is 525 lines per picture.

Once a definite standard of definition is fixed, all receivers manufactured to receive such a television service must be designed to deal with the standard of definition adopted. If it is decided to increase the number of lines transmitted per picture, then all existing receivers must either be scrapped or adapted at some expense to cater for the new standard of definition. As a consequence, unless very careful thought is given the matter when the standards are first adopted, there is a grave risk of the public being forced to shoulder considerable and unwarranted expense when it is found later that such standards are inadequate to provide a satisfactory service — or perhaps is would be better to say when it is found that it is possible to greatly improve the service by adopting new standards.

The C.B.S. system showed up rather badly in the matter of picture brightness and contrast. It is considered that the brightness of a televised image is one of the most important performance characteristics of a television receiver. In this respect it is desirable that the scenes viewed on the television receiver screen should be sufficiently

bright to enable comfortable viewing to be achieved without any darkening of the room, even under broad-daylight conditions. C.B.S. were unable to satisfy the Commission that receivers designed for their method of colour television could satisfy such requirement.

The unit of measurement used to make comparisons of brightness is the foot lambert. One foot lambert represents the brightness of one foot candle of illumination reflected from a perfect reflecting surface. A foot candle of course, is the amount of illumination produced by one candle power at a distance of one foot.

Dr. Goldmark claimed that Columbia had developed a receiver in its laboratory capable of producing 22 foot lamberts of illumination. At the demonstration before the F.C.C., however, none of the C.B.S. receivers were able to develop more that 15 foot lamberts. On the other hand, the Allen B. Dumont Laboratories Inc. gave demonstrations of black and white direct viewing receivers which produced an average highlight brightness in the vicinity of 750 foot lamberts. The Philco Radio Corporation demonstrated a projection type of receiver which produced an average brightness of 35 foot lamberts. The results achieved by the last named organisations seemed to refute the claim by Columbia that their system provided illumination equal to monochrome.

In defence of the comparatively poor showing of their own receivers, C.B.S. claimed that the additional brightness of the Dumont and Philco receivers was totally unnecessary and that the brightness of the Columbia picture was quite adequate for viewing under normal conditions of room illumination. At this point, a technical argument commenced which eventually resulted in Columbia being over-ruled.

Closely related to the problem of picture brightness is the question of flicker. Excessive flicker of the image on a television screen is extremely tiring to the eyes just as it was in the early days of motion pictures. For a given picture frame rate, flicker will become more objectionable as the brightness of the image is increased. This was regarded by the F.C.C. as one of the major drawbacks to the Columbia system because it would not be feasible to increase the brightness of their image due to the increased perceptibility of flicker. The C.B.S. employed a frame rate of 24 per second, instead of the present monochrome standard of 30 per second (in U.S.A.).

Much of the evidence tendered by the C.B.S. on the low flicker characteristics of their system was discounted by the F.C.C. because of the fact that all the tests were conducted with a relatively small group of persons. What is more, all of the persons were not only employees of Columbia, but were employed on the development of the system which they were supporting by testimony. The Commission did not consider that their testimony was sufficiently unbiased to be of any value. Furthermore, all the Columbia tests were based upon the fact that viewers would be seated at a distance from the television receiver equal to seven times the height of the picture. Although a viewing ratio of 6:1 is frequently quoted as being desirable, field tests and laboratory experiments appear to indicate that an optimum viewing distance is about 4:1. This provides a reasonable compromise between the perceptibility of flicker and adequate brightness of the image.

Assuming a viewing ratio of 7:1 difficulties are likely to arise with the larger screen sizes in home

television receivers. For instance, with a picture 18" high which is not uncommon nowadays for monochrome reception in the U.S.A. the viewing distance would have to be 10½ feet. This could quite easily lead to difficulty in the average living room where it may not be easy to place furniture to give an unrestricted space of this magnitude.

With the Columbia sequential system of colour television it would not be practicable to increase the frame rate in order to overcome objectionable flicker because even with the frame rate of 24 pictures per second, the band width of the Columbia system is 16 megacycles. To increase the frame rate would still further increase this band width and consequently place greater restrictions on the number of stations possible within a given band.

The Radio Corporation of America representatives underlined this disadvantage by demonstrating a simultaneous colour transmission which, although employing the comparatively high frame rate of 30 per second, normal in present U.S. monochrome transmissions, occupied a channel only 12.5 megacycles wide.

Quite apart from the additional band width higher frame rate would also mean that the speed of the colour filter wheel in the C.B.S. method would have to be increased from 1440 revolutions per minute to 1800 revolutions per minute in order to allow an increase of frame rate from 24 to the present standard of 30 per second.

Although as just mentioned, R.C.A. *did* demonstrate a simultaneous colour television system, they were quite emphatic that they had not presented it as representing a system which could be developed for commercial use in the immediate future. Their engineers considered that four to five years must elapse before their method will have reached the stage where the results can be considered equal to present day monochrome transmissions.

One of the receivers used by Columbia for demonstration at the F.C.C. hearing employed a 7" direct viewing tube. In front of the tube was placed a magnifying lens which gave the same apparent effect as a 10" viewing screen. However, this lens has subsequently been abandoned by Columbia because apart from the nuisance created by reflections from room lights and windows, the viewing angle was severely restricted by the necessity to look through the centre of the lens. The use of a larger screen introduced difficulties in that the diameter of the colour wheel would also require to be increased. With the 7" tube the diameter of the colour wheel is 16". With a 20" diameter tube the colour wheel would have to have a diameter of 42". Apart from the awkwardness attached to the housing of this wheel in a reasonably sized cabinet, the noise problem created by such a disc rotating at 1440 revolutions per minute would be rather acute.

Dr. Goldmark, testifying for C.B.S., had a counter to this objection. He pointed out that the colour wheel was not an integral part of their sequential system. He considered that colour could be produced under the sequential system by employing three different viewing screens, each one coated with a special slow decay fluorescent material, each one sensitive to only one of the three primary colours transmitted. However, both Dumont and R.C.A. representatives pointed out that their companies had already conducted experiments along these lines and found that tubes of the type mentioned by Dr.

Goldmark were objectionable to use and in addition they created unnecessary circuit complication. The Commission took the view therefore that there was a considerable element of doubt whether the Columbia system was applicable to other than the colour wheel method of transmission.

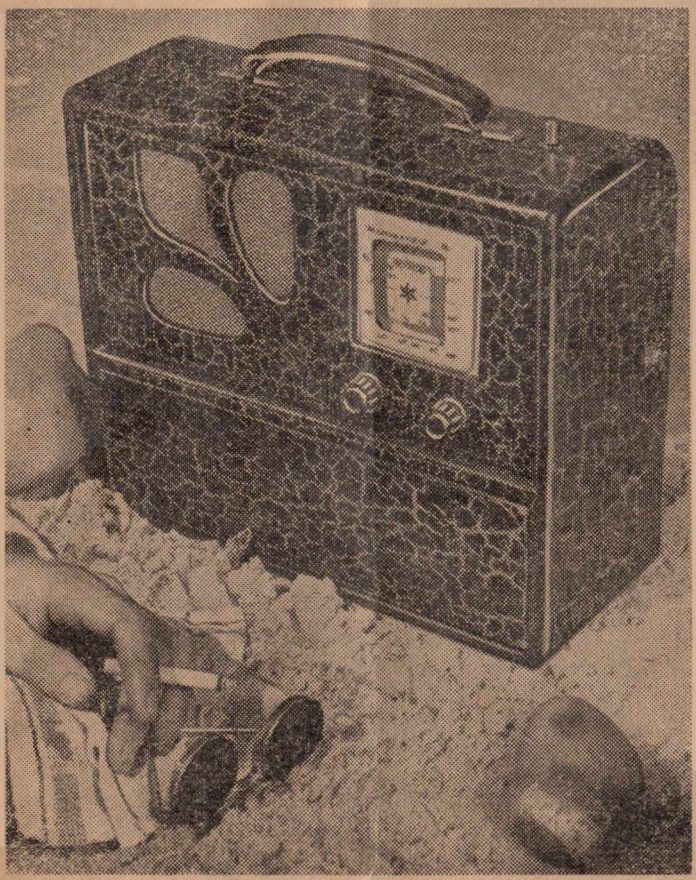
In making their final pronouncemen, the Commission stated that in its view further experimentation is necessary in the colour television field. We quote the actual text of the report here. "From a consideration of the Columbia petition and the evidence adduced at the hearing, it is evident that the Columbia system is in effect the present monochrome television system with colour added. While the present system affords an adequate black and white service for the public, the fact remains that it was developed and standardised before the extensive developments in electronics that took place during the war. It is quite possible that as a result of war-time discoveries, improvements can be made, e.g. in picture detail, picture sharpness, a simpler and more effective synchronisation system, a better sound system, etc. Furthermore, war-time developments may show that there is an entirely different method from either the sequential or simultaneous system which is superior to both. Before standardising television in the higher frequency bands we should be sure that all of the war-time electronic developments have been explored to determine whether they can be applied to the advantage of television. The war-time security precautions have been lifted so recently, that much of the vital information developed during the war probably has not seeped down to all elements of the industry working on television problems. The effect of these war-time developments cannot be fully felt until there has been this wide-spread dissemination of information. Two specific problems in the Commission's opinion should be carefully examined. In the first place there should be further experimentation looking towards the development of low cost television receivers. A large portion of the radio spectrum has been allocated for television. The demand for space in the spectrum from other radio services is very keen and it is not possible to satify all requests. The objective of television, to bring news, education, culture and entertainment to large numbers of people, cannot be carried out unless television receivers are manufactured and sold at a price which the average family can afford to pay."

The report went on to say that any system which demanded greater channel width than that at present occupied by television station could not be entertained at the present time, because if a nationwide coverage for television programmes was to be achieved, the maximum number of available channels was necessary. Incidentally, it should be remembered here as in reading the whole of this digest that the report dealt only with American conditions. Nevertheless, one can still read the information with a good deal of interest because television developments in this country must, of necessity, be related to developments overseas.

The ultimate impression created by this F.C.C. report is that colour television on a commercial scale is still quite a long way off.

A New Four Valve Battery Portable

In summertime a young man's fancy lightly turns to thoughts of portables—and other things of course, but we are not interested in those except insofar as the lack of a good portable radio receiver might affect his chances of success in regard to those other things.

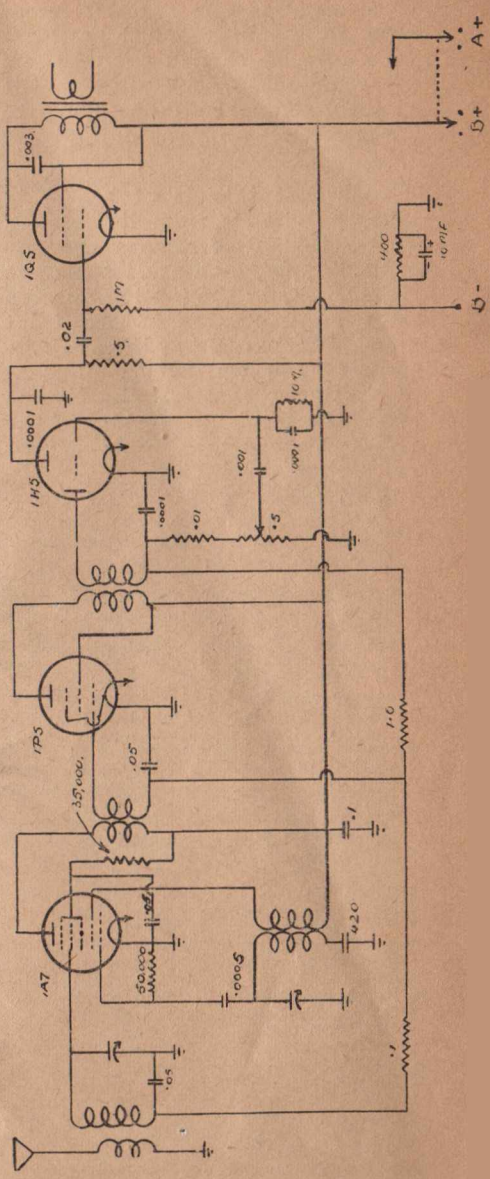


We are well aware of the fact that this is not summer. Well, why worry, you ask, let's wait until summer comes before we start thinking about portables, that will be plenty of time. We beg to differ. Your favourite blonde won't wait while you spend all your weekends tramping around from shop to shop endeavouring to buy parts to build the portable—and that is what will happen if you wait until summer

is here before you start to think about building the set. The time to build is now, and then by all means, when summer does come, let your thoughts turn to the pleasures of music in the sun, but with this difference, your set is already built.

The set we are about to describe is a 4 valve portable for use on the broadcast band. The following valves are employed: 1A7GT converter, 1P5GT I.F. amplifier, 1H5GT second detector and first audio amplifier, 1Q5GT power output. There is nothing unusual about the circuit arrangement. It is quite straightforward and not at all difficult to get into satisfactory operating condition.

The performance of the completed receiver is good, in fact extremely good for its size. One of these sets operated on the roof of our city building received all the Sydney stations without any difficulty at all, and this without any aerial. It may be noted on examination of the circuit diagram that the receiver does not use a loop aerial but instead employs the orthodox aerial coil, a lead being taken from the primary of this coil to a terminal located on the top of the receiver's cabinet. With about six feet of wire connected to the aerial terminal, station 2KA could be logged easily in daylight.



CONSTRUCTIONAL HINTS.

The receiver comes to you as a complete kit of parts, and when we say complete we mean that you get everything right down to the last nut and bolt, even a Rola 5" permag speaker and Minimax batteries. In building any receiver, probably the most difficult job is laying out the components so that all leads will be as short as practicable and that grid and plate leads are well spaced from each other. With the set under discussion, this particular task is already

performed for you. The kit comes with all the mechanical assembly work already carried out. All you are required to do is wire up the various components according to the circuit diagram shown in Figure 1.

Your first task is of course to take the chassis from its cabinet. To do this, first remove the two control knobs, then extract the two brass screws in the top left and top right hand corners of the front panel. The panel may then be lifted out. You will notice adjacent to the lower edges of the chassis two grooves cut in the sides of the cabinet. These grooves are to accommodate the flange on the ends of the chassis, consequently to remove the chassis from the cabinet it must be pulled straight towards you.

In the bottom of the cabinet you will find a parcel containing all the small parts such as resistors, condensers, battery plugs, grid clips, etc., also two 45 volt Minimax batteries and one 1.5 volt battery. Before making a start on the actual wiring up of the set, you are advised to carefully check the kit of parts with the undermentioned list.

When you are sure that you have accounted for everything, you may turn your attention to the preparation of the various components for the wiring-up process. First remove all the valves from their sockets and put them in a safe place. Although they will stand ordinary handling they have any valve's marked antipathy to being dropped on the floor. Next remove the speaker from the chassis. If you are one of those particularly careful and quite unnatural people who never put their fingers through the cones of speakers, you may leave it on the chassis. However, if you are wise you will remove it and also put it in a safe place.

Now turn the chassis upside down, first making quite sure that the tuning condenser plates are turned right in, and then carefully tin all the solder lugs on valve sockets, resistor strips, coils, potentiometer and the eight solder lugs placed under the holding-down bolts of the I.F. transformers. Also tin portion of the wiper springs which make contact with the condenser's moving plates. The connections to the fixed plates of the condenser are accessible from

PARTS LIST.

*13 ¼ x ¾ whitworth bolts.
*21 ⅛ nuts.
*1 4 - way resistor strip.
*8 ½" brass wood screws.
3 feet spaghetti.
3 feet 18 gauge tin copper wire.
1 foot shielded Belden wire.
2 yards Belden.
4 pieces of Belden wire, each 1' long (four different colours) for battery leads.
*1 NP terminal.
3 small grid clips.
*4 octal sockets.
1 GT valve shield.
2 trimmers.
1 chassis.
1 cabinet and panel.
2 bakelite knobs.
2 felt washers.
1 1A7GT valve.
1 1P5GT valve.
1 1H5GT valve.
1 1Q5GT valve.
2 type 482 Minimax B batteries.
1 type 745 Minimax A battery.
*1 dial assembly.
*1 2 gang condenser.
*1 5" pm. speaker.
*1 aerial coil.
*1 oscillator coil.
*2 I.F. transformers.
*1 .5 meg. potentiometer, with switch.
2 .1 mfd 400V condensers.
2 .05 mfd 400V condensers.
1 10 mfd 40 PV electrolytic condenser.
2 0.0001 mfd mica condensers.
1 0.001 mfd mica condenser.
1 0.003 mfd mica condenser.
1 0.02 mfd 600V condenser.
1 0.00025 or 0.0001 mfd mica condenser.
1 0.0005 mfd mica condenser.
1 420 mmfd padding condenser.
2 1 meg BT1 resistors.
1 10 meg BT1 resistor.
2 0.1 meg resistors, ½ watt.
1 35,000 ohm resistor, 1 watt.
1 0.5 meg resistor, 1 watt.
1 400 ohm wire wound resistor.
1 0.05 BT1 resistor, ½ watt.

All those items marked with * are already assembled on the chassis.

the top of the chassis. These lugs should also be tinned.

You are now ready to commence the wiring. With this receiver as with any other, some systematic method of wiring is advisable in order to avoid mistakes and forgotten connections. It is wise to commence with the filament connections as it is most important that no error be made here. The filament connections to all the valves are the same, viz Nos. 2 and 7. A word concerning the method of numbering the sockets may be desirable here although it is assumed that you are fairly familiar with them. Looking at the sockets from below the chassis, pin No. 1 is immediately to the left of the key-way, and the numbering is continued in a clockwise direction until one arrives at pin No. 8 which is of course immediately to the right of the key-way. You are advised to follow this method of identifying the pins rather than rely on the numbers on the sockets.

Unlike indirectly heated types of valves, we have, with the filament type, to adhere to a definite polarity in the wiring up of the sockets. In this case, pin No. 7 is filament minus while pin No. 2 is filament plus. The filament minus connections may be made where convenient to one of the solder lugs on the chassis. All the filament-plus connections should be connected together. The wiring of the filament circuit may be completed by making connection to two of the lugs on the resistor strip for later connection to the battery leads and switch.

The colour coding of the aerial and oscillator coils and I.F. transformers are as follows. Red is B plus in the case of the two I.F. transformers and the oscillator coil, while the red lug on the aerial coil connects to earth. Incidentally, the aerial coil is the one having the black dot in one corner, while the oscillator coil has a red dot in one corner. The black lug on the first I.F. transformer connects to grid return or the A.V.C. line. The black lead on the second I.F. transformer connects to earth via a .1 meg and the .5 megohm potentiometer. The green **lead** emerging from the top of the first I.F. transformer connects to the grid cap of the 1P5GT valve while the green **lug** on the second I.F. transformer connects to pin No. 5 of the 1H5GT valve socket. The blue lead on the first I.F. transformer connects to pin No. 3 on the 1A7GT valve socket while the blue lead on the second I.F. transformer connects to pin No. 3 on the 1P5GT valve socket. The green lug on the oscillator coil connects to one of the fixed sections of the tuning condenser, preferably the one nearest the back of the chassis. The green lug on the aerial coil connects to the front section of the tuning condenser's fixed plates. The black lug on the oscillator coil connects to one end of the 420 mmfd padder condenser. The other end of this condenser goes to earth. The black lug on the aerial coil also goes to the A.V.C. line. The blue lug on the oscillator coil connects to pin No. 6 on the 1A7GT valve socket. The blue lug on the aerial coil goes to the terminal on the top of the cabinet.

The wiring of the battery switch located on the back of the volume control potentiometer needs some care if damage to the valve filaments is to be avoided. The switch is of the double pole single throw variety. One section is used to close the filament circuit while the other section is used to close the plate circuit when the knob is turned to the right. Looking at

the back of the switch and moving in a clockwise direction the lugs may be identified as follows. Lug No. 1 fixed contact first section, lug No. 2 moving contact first section, lug No. 3 moving contact second section, lug No. 4 fixed contact second section. The A battery positive lead should be connected to pin No. 1 while the B battery positive lead should be connected to lug No. 4. Lug No. 2 should connect to the A positive connection on the valve sockets while lug No. 3 should connect to the B plus connections on the various coils.

The two small semi-adjustable trimmer condensers are for connection across each section of the main tuning gang — one trimmer between each set of fixed and moving plates.

As it is assumed that those building this receiver have had some prior experience, we are not giving any detailed description of how to wire in the remaining small components. The ability to read a circuit diagram will ensure that you will have no trouble in regard to the placement of these small components. When you have finally completed the wiring, check your work very thoroughly to make certain that you have not mixed any of the B plus connections with the filament wiring. This would be disastrous. Care is also necessary when connecting the battery leads to their appropriate plugs. The A battery leads should connect to the small two pin plug while the B battery leads should connect to two of the pins on the three pin plug. If you make quite sure of this, no harm can come to the valves because the two plugs are non-interchangeable.

With the receiver completed and the batteries connected, you should be able to hear all the Sydney stations by rotating the dial because the coils have been pre-aligned by the manufacturer and should not require any great degree of adjustment. This assumes of course that the slugs have not been touched prior to being wired into the set.

In order to check the alignment, tune to a station at about the middle of the broadcast band and turn one of the slugs on say the first I.F. transformer very slightly in one direction or the other; if an increase in volume is noted, keep turning in the same direction until a peak is reached. Make a similar adjustment to the second slug on the first I.F. transformer, then repeat the process with both slugs on the second I.F. transformer. Remember that you should not have to make a very drastic adjustment and so avoid turning the slug too far to begin with.

The adjustment of the aerial and oscillator coils may now be undertaken. First of all, tune to station 2SM and make a slight adjustment of the trimming condenser connected across the oscillator section of the gang. Retune to the station and note if any increase in volume has taken place. If there is an increase, continue to turn the trimmer slightly in the same direction, retuning the receiver after each adjustment. If on the first adjustment a decrease in strength is noted, then obviously it is necessary to turn the trimmer in the opposite direction. Having peaked the oscillator trimmer, perform the same function with the trimmer connected across the aerial section of the tuning condenser, but this time of course, the main tuning control is not touched during the process.

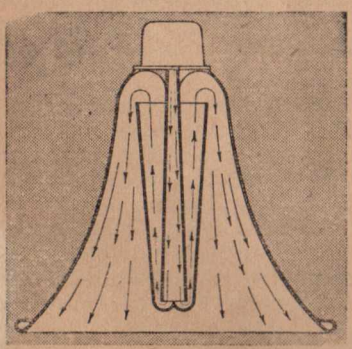
If after peaking the two trimming condensers, you find that the black line on the condenser drum

does not coincide with the station call sign marking for 2SM, undo the set screw clamping the drum to the condenser shaft and position the pointer line on the station call sign without moving the condenser itself. Now tighten up the drum set screw once again so that it securely grips the shaft.

To check the alignment at the low frequency end of the dial, tune to station 2FC and then slightly move the slug on the aerial coil noting whether any increase or decrease in volume has taken place. The position of the oscillator slug should not need any adjustment, but if 2FC is very far from its correct position on the dial, it is permissible to make slight adjustment of the slug in order to bring the station into its correct tracking position. If it is necessary to do this, then you may find that you will also have to make a slight readjustment of the trimmers at the high frequency end of the dial.

THE CHOICE OF A LOUDSPEAKER (continued)

Objection has frequently been raised regarding the somewhat ungainly appearance of the straight exponential horn, and to the fact that their size tends to put them at the mercy of high winds. During the war the necessity for efficient lightweight speakers of fairly small size, brought about the revival of the reflex projection horn. The principles involved are not new, but for some years speakers of this



type were eclipsed by the straight horn, no doubt due to the rather greater difficulty involved in the design of the reflex type. However, modern versions of the reflex projection horn seem to have overcome any of the faults of their early prototypes, and in the future, their use in the P.A. field is likely to become wider and wider. Briefly, the reflex type is essentially the same as the straight exponential horn, except that the air column is folded in order to achieve the effect of a long horn in a much smaller space. Incidentally, another very great advantage of the projection type of speaker, whether it be the straight or reflex horn, is that acoustic feedback between speakers and microphone is very greatly minimised even when the microphone is unavoidably located in the immediate vicinity of the speakers.

The illustration will give you some idea of the way in which the reflex horn operates. The arrows indicate the direction in which the varying air pressure produced by the vibrating diaphragm is acting. It is perhaps better to think of the operation of the horn type speaker in this way, that is, that the diaphragm is acting like a piston and producing changes in air pressure throughout the length of the horn. These air pressure changes are eventually communicated to the outside air and the listener's ear

interprets them as sound. This is a rather better conception we would say, than to think in terms of sound waves travelling from the diaphragm to the mouth of the horn.

Speech or Music

The use of the projection type horn is eminently suited to the reproduction of speech. Its use for the reproduction of music must be subject to some qualification. Where the music is being reproduced in the open air or in a factory or similar location, where the noise level is fairly high, the volume of sound produced by the speaker or speakers will have to be fairly considerable. In such cases, it is not necessary that the bass response of the installation be as good as when one is concerned with the high quality reproduction of sound in a concert hall where acoustic noise level is virtually non-existent. Even if, in the former case, we did reproduce the extreme low notes in their correct proportion they would be absorbed in the general noise level present in the average factory, while in the open air they would be heard only by those people in the immediate vicinity of the speakers. You will have no doubt noticed yourself that if, while listening to a band playing in the open air you begin to walk away, the sound produced by its bass instruments dies away very quickly after you have moved some little distance from the band.

Where music is to be reproduced at high quality in quiet locations, the horn type speaker is not entirely suitable because even with a flare diameter of two feet, the low frequency cut-off is located at about 100 cycles. As a matter of fact, one well-known type of reflex projection horn speaker manufactured in Sydney, has a frequency range of 115 cycles to 5,000 cycles. This is achieved with a flare diameter of 25 inches. The depth of the speaker incidentally, is only 18 inches and its weight a mere twelve pounds. The total length of the air column of this type is 5 feet, which will give you an idea of the superiority of the reflex type over the straight horn so far as compactness is concerned.

For the technical details in the previous paragraph, and for the use of the block illustrating the action of the reflex horn we are indebted to Messrs. Amplion (A/sia) Pty. Ltd. This firm also gave us the opportunity of trying out one of these speakers in the College lecture hall. The amplifier with which it was used incidentally, was the one described elsewhere in this issue.

The test proved eminently satisfactory and certainly justified the company's claims for their product. In the past, we have had considerable trouble when using direct radiator cone type speakers, with acoustic feedback between speaker and microphone. With the horn speaker in question this trouble was reduced to negligible proportions. It is interesting to note that complete coverage of the hall was achieved with only about 0.25 watt of electrical power supplied to the speaker.

Although theatre sound systems employ large projection type horns behind the screen, these are specially designed to reproduce the extremely low frequencies in their correct proportion. They are consequently extremely expensive. For high quality reproduction of music at reasonable cost the vented enclosure and acoustical labyrinth type of speaker loading device represents an ideal solution. These types of speaker baffle tend to extend the low frequency response of the speaker and to minimise harmful effects due to the speaker's bass resonant frequency.

BUYING SERVICE NOTES

It appears that the position, as far as radio materials are concerned, still remains very much the same, although in the main, some improvement is evident. The improvement appears to be in the greater variety of components now available. Items which in the past have been impossible to procure, such as midget I.F.'s, midget coils, midget gangs, certain valves, various types of kit sets, have now made their reappearance on the market. At the same time, very little improvement has been made in the supply of some items which are vital to radio servicing and set building, such as electrolytic condensers, speakers, some types of valves etc. However, it is hoped that conditions will gradually improve, and students are advised to keep their orders placed with their usual radio suppliers.

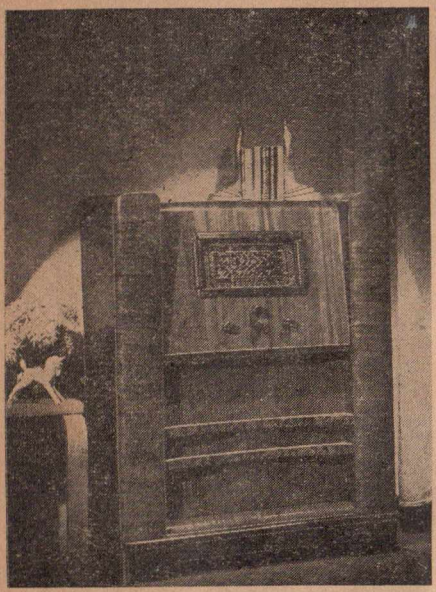
Are you interested in signal tracers? If so, you are sure to be interested in the new University signal tracer to be released shortly. But wait for it, details are not yet available, we will give you a full description of this fine new instrument as soon as specifications etc. come to us.

Things are moving at Electronic Parts Pty. Ltd., (located at the same address as the College) the up-to-date radio distributing firm which specially caters for A.R.C. students' requirements. In this issue we are happy to reproduce for you illustrations of the "Elecpar" range of radio receivers. These sets are distributed solely by Electronic Parts Pty. Ltd., there is a most comprehensive range available, and the manufacturers have endeavoured to supply a receiver to suit every purpose. These radio receivers are made available to A.R.C. students who are interested in earning money in their spare time. If you are interested, get full details from Electronic Parts Pty. Ltd. We might also mention that the same firm are distributors for the well-known brand of "Telaverta" radio receivers. They will also be glad to give you details of these receivers upon request.

In these days of acute battery shortages readers will be pleased to know that good stocks of the well-known "Stan-Mor" Dry Batteries are available from Electronic Parts Pty. Ltd. Recently this firm had the good fortune to be appointed distributors for "Stan-Mor" dry batteries and they will be glad to fulfil your requirements should you send your orders along to them.

Over the past few months in this magazine you have seen reproduced articles describing the building of various radio receivers. This means that the day of the kit is back again. 'Tis true it is not booming as in the pre-war years, but as more materials become available, you may rest assured suitable kit sets will be reproduced and made available to A.R.C. students. The firm making these kit sets available is Electronic Parts Pty. Ltd. They have a goodly range to offer you at the moment. This range includes the portable described in this issue, the high fidelity 20 watt amplifier, a 4 valve A.C. mantel type receiver, a 1 valve broadcast and short wave experimental receiver, and Electronic Parts Pty.

(Continued on page 16)



The "Windsor"

"ELECPAR"

FINE RADIO RECEIVERS

MODERN times demand modern designs plus economy in radio receivers. Of these you have both in the latest "Elecpar" models. A wide range of console types are available in the two handsome cabinets illustrated. The circuits to which these receivers are designed are really outstanding technically, resulting in a wide clear tonal range with ample volume for all requirements.

"ELECPAR" MODELS

Available in the "Windsor" cabinet and dial:—

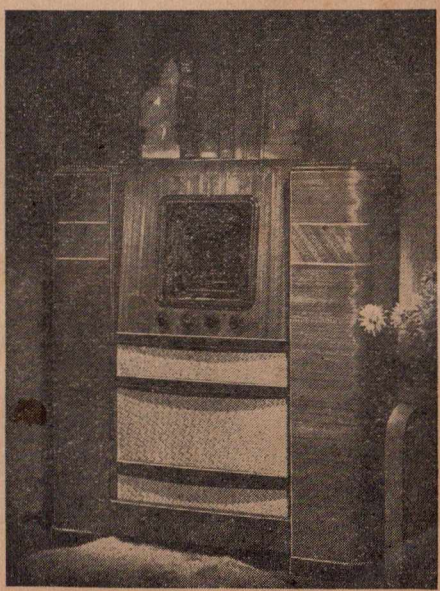
5 Valve Dual-Wave de Luxe A.C. 12" Speaker
5 Valve Broadcast de Luxe A.C. 12" Speaker
5 Valve Dual-Wave Battery (Stage R.F.) 10" Speaker

"ELECPAR" MODELS

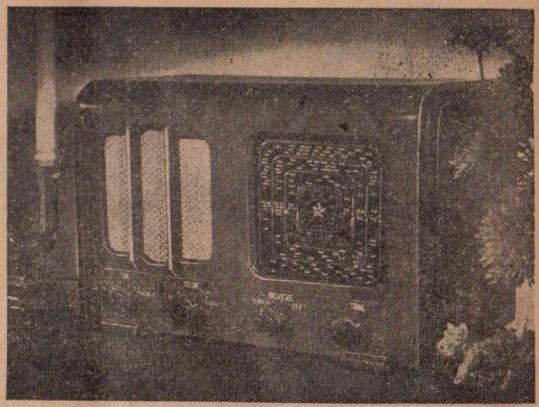
Available in the "Grosvenor" cabinet and dial:—

4 Valve Dual-Wave A.C. 8" Speaker
5 Valve Dual-Wave A.C. 8" Speaker
5 Valve Dual-Wave Battery (Stage R.F.) 8" Speaker

The "Grosvenor"



THIS tastefully veneered table cabinet brings to you the junior "ELECPAR" models. They are junior in size only, for they incorporate the full quota of senior technical features. It is an ideal size for those with limited space and who require a radio set which can be taken from room to room with ease.



"The Piccadilly"

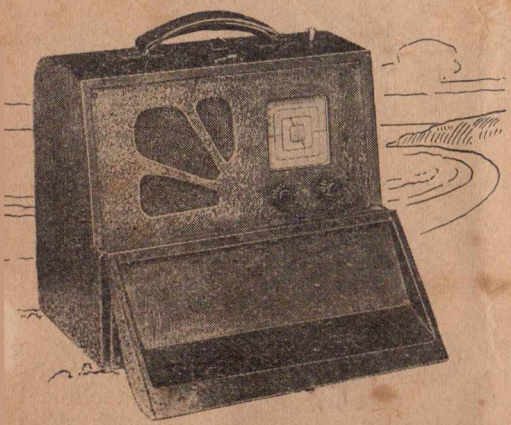
"ELECPAR" MODELS

Available in the "Picadilly" cabinet are:—

5 Valve Dual Wave Battery (Stage R.F.) 5" speaker, with dial as illustrated.

4 Valve Broadcast A.C. 5" Speaker.
5 Valve Broadcast A.C. 5" Speaker.
5 Valve Dual Wave A.C. 5" Speaker.
(The above A.C. models are fitted with vertical straight line tuning dial.)

"ELECPAR" . . . for portability too



THERE'S nothing to come up to this "Elecpar" Portable. Using a new and entirely revolutionary design, which eliminates the old idea of a loop aerial, this 4-Valve Portable brings in local and, in many locations, even distant stations, at excellent speaker strength. When in the car, or boat, a few feet of aerial attached to the terminal provided will bring splendid results.

"ELECPAR"

A product of Electronic Parts Pty. Ltd.
Sydney, Australia

A.R.C. TRADING POST

A free Buy - Exchange - Sell Service for A.R.C. Students

FOR SALE: Various valves, speaker, resistors, electrolytics, etc.; cheap. Write to
D. T. Newell, Golf Links, Gatton, Qld.

FOR SALE: 1 valve set, complete with cabinet and batteries, less headphones, almost new, £5.
D. King, Llandilo, via St. Marys, N.S.W.

1 Only Dynamike, complete with transformer and desk stand in perfect order. Brand new, never been used. Sell at £10/10/- the lot.
D. J. Bree, 100 Beulah St., Gunnedah, N.S.W.

FOR SALE: Valves. Two 5Y3G, 10/- ea. One 6A8G, 15/-. One 6B8G, 15/-. One 6F7G, 15/-. 1D5GP, 15/-. One 1N5GT, 15/-. Two 1A7GT, 15/- ea. One 1C7G, 15/-. One 6K7 Metal, 15/-. One 6F5 Metal, 15/-. One 4 gang condenser and Drum Dial, £1.
R. Miles, King St., Molong, N.S.W.

WANTED: "R & H" April 1942, Oct. '44, Sept., Oct. '45.

W. D. Ballard, Moore St., Campbelltown, N.S.W.

FOR SALE: Following valves. Two 30's 12/6 ea. One 34 7/6. One old pilot type single gang condenser 2/6. One B class audio transformer 3/-. Apply
E. Keefe, Gordon St., Bowen, Qld.

5 Watt 4 valve amplifier with microphone but no speaker. £10.
K. Cooper, Bass Ave., East Hills.

FOR SALE: 8 Inch Amplion dynamic speaker, 2,500 ohms F.C., 7,000 ohms impedance, in good order. 25/-.
W. J. Pitt, Box 39, P.O., North Sydney.

WANTED: One 5" speaker, 1500 ohm field to suit Little General wireless. Write to
C. A. Davidson, No. 13 Cramb St., Ipswich, Qld.

FOR SALE: One only polished wood mantel cabinet, length 9½", width 6½", height 7". £1 or offers.
G. King, 105 Ridge St., Greenslopes, S.E.2, Bris., Qld.

Do you want to buy, sell or exchange something with a fellow student? If so, the College will gladly insert your advertisements free of charge on this page. Write carefully—or, better still, print your advertisement. Condense it to 30 words or less, and it must be confined to radio subjects. The College of course reserves the right to re-write advertisements as necessary, or to reject those that may not fit in with the spirit of this service.

(Continued from page 13)

Ltd. are in a position to quote you for kits of parts to build up various "Radio and Hobbies" circuits.

Have you purchased your copy of the Philips Manual of Radio Practice? This is a remarkable technical book, and every student, technician, radio serviceman, indeed every person employed in a technical capacity in the radio trade should have a copy of the Manual. The College has been granted the distinction of being appointed a full distributor for this book, and copies are available from the College at 22/6 post free. If you have not read about the book before, we will gladly send you along a descriptive leaflet if you care to write to the A.R.C. Sales Department.